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ESTIMATE OF ELECTRO-OPTICAL METEOROLOGICAL PARA-
METERS FROM SATELLITE-DETECTED RADIANCES
BY: TH VONDERHAAR, M WETZEL

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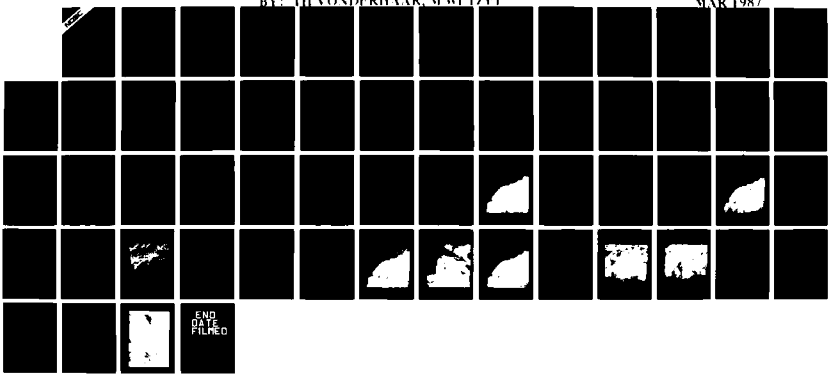

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NAVAL OCEAN SYSTEMS CENTER San Diego, California 92152-5000

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March 1987

Estimate of Electro-Optical Meteorological Parameters from Satellite-Detected Radiances

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M. Wetzel

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This document describes research that includes the implementation of atmospheric transmission models, collection and analysis of digital image data from GOES, DMSP, and NOAA satellites, development of a monochromatic radiative transfer model for marine stratus clouds, and the design and testing of a spectral radiometer for marine boundary layer applications. Summaries of the research project and results are provided in this report. Section 2 describes the analysis of estimating clear-sky atmospheric transmittance from satellite data. Section 3 summarizes the research pertaining to remote sensing applications for boundary layer clouds.

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CONTENTS

1.0 SUMMARY

This report describes work completed during the contract period 15 August 1985 - 14 August 1986. The research tasks include the implementaiton of atmospheric transmission models, collection and analysis of digital image data from the GOES, DMSP, and NOAA satellites, development of a monochromatic radiative transfer model for marine stratus clouds, and the design and testing of a spectral radiometer for marine boundary layer applications. Two field programs have been carried out in collaboration with NOSC in the San Diego area, and data from previous research studies have been incorporated into this research.

Results from portions of the work were published, and these papers were presented at conferences sponsored by the American Meteorological Society and DoD. Summaries of the research project and results are provided in the body of this report, and relevant publications are listed in the References section. Section 2 describes the analysis pursuant to estimating clear-sky atmospheric transmittance from satellite data. Section 3 summarizes the research pertaining to remote sensing applications for boundary layer clouds.

2.0 SATELLITE OBSERVATIONS OF CLEAR-SKY RADIANCE

The improvement of the Air Force Geophysical Lab (AFGL) atmospheric transmittance/radiance code (LOWTRAN 6) to include a maritime aerosol model and scattered solar radiation provides the opportunity to intercompare the modeled scene radiance with satellite image data. The objectives of these comparisons are: (1) to evaluate the sensitivity of the LOWTRAN 6 code to local haze and aerosol conditions, (2) to check the correspondence between calibrated satellite radiance and model estimates, and (3) to identify means of enhancing the information content of satellite image data.

2.1 Sensitivity of LOWTRAN 6 to Boundary Layer Conditions

Surface meteorological data, sea surface temperatures and atmospheric sounding profiles available for the San Diego area during the 15-18 April 1986 experiment period were used to initialize the LOWTRAN model for shortwave and longwave radiance calculations. The sounding profiles provided by ship-launched balloons off Pt. Loma supplied marine atmospheric parameters up to 500 mb, and the NWS 12-hourly rawinsonde data were applied above this level. The April data set utilized for LOWTRAN is summarized in Table 1.

Direct evaluation of LOWTRAN 6 sensitivity to atmospheric fluctuations were approached by specifying each of the required parameters for the radiance model, and varying those for which some uncertainty was expected. The parameter ICSTL is the most uncertain, since it is a qualitative measure of the prevalence of continental aerosol in the marine boundary layer. If ICSTL is specified to be ten, the aerosol is entirely continental in the size distribution and optical characteristics. ICSTL set equal

to unity infers an entirely marine aerosol layer near the surface (0-2 km). Variations in longwave radiance and visibility calculated with LOWTRAN 6 were found to be sensitive to correct choice of the surface wind speeds and relative humidity in particular. Table 2 provides selected comparisons of these values for varied input parameters. When using observed values of these and the other meteorological inputs, it was estimated that the values for ICSTL should lie between three and five for the April study period in order to reproduce visibility conditions. However, radon measurements obtained from ship indicated that the ICSTL parameter should be scaled to unity, at least for the two-day period of April 15-16. It is difficult to reconcile the calculated visibility under the measured values for ICSTL, surface winds and surface relative humidity. The relatively low visibility of the marine air would seem to require higher relative humidity to be assumed at the surface. The LOWTRAN 6 model should perhaps utilize the higher moisture contents measured above the surface.

Durkee (1986) has provided evidence from a case study of satellite channel radiances that the quantity L/E, where L is a shortwave upward-directed radiance and E is downwelling irradiance, varies with wavelength in a manner that is related to the aerosol population. This quantity is equal to the directional reflectance factor for hemispheric incidence, if multiplied by the constant π steradians. We shall refer to this quantity as directional reflectance (DR_λ), with the assumption that it is specific to a narrow wavelength region centered on the wavelength λ. Durkee (1986) related the ratio of DR_λ values in the red (λ = 0.63 microns) and near-infrared (λ = 0.86 microns) satellite channels of the NOAA-7 AVHRR and NIMBUS-7 Coastal Zone Color Scanner (CZCS) to the presence of continental aerosol. We have utilized the atmospheric conditions during the April

field program to calculate radiance in similar wavebands. For later comparison to satellite data collected in April (see Section 2.2), Channel 1 (red) and Channel 2 (near-infrared) wavebands were chosen to match those of the NOAA-6 and the NOAA-9 AVHRR instruments, which are quite close to the NOAA-7 AVHRR channels. The results of the LOWTRAN model calculations in these wavebands are summaried in Table 3 showing the dependence on aerosol characteristics, including aerosol origin, concentration and degree of hydration. Specifying two atmospheric paths in which the 0-2 km boundary layers have equal transmittance at $\lambda = 0.55$ µm (equal visibility), but different aerosol populations, the atmosphere with a marine aerosol layer has a notably lower near-infrared (NIR) radiance, while the red-waveband radiance is only slightly less than in the case of a rural aerosol population. For the afternoon conditions observed on April 18 during the field experiment period, and assuming marine aerosol and a 23 km visibility, NIR radiance is 0.29 $mWcm^{-2}sr^{-1}$ while red radiance is 0.42 $mWcm^{-2}sr^{-1}$, and the ratio of radiances for red vs. NIR is 1.45 for the marine aerosol, while it is 1.62 for the assumption of a rural aerosol composition. Relative humidity effects are manifest through absorption of near-infrared radiation in the presence of any aerosol, and through shortwave extinction by haze droplets in the presence of the deliquescent marine aerosol. For example, a shift in the surface relative humidity from 88% to 68% for an entirely rural aerosol population decreases the red/NIR radiance ratio, primarily by increasing NIR transmittance. For comparisons such as these, the radiance ratio is sufficient, since the second multiplicative term in the expression for the DR_λ ratio is the NIR/red downward irradiance ratio, which will be a constant. Quantitative comparison of DR_λ ratios in the satellite channels is accomplished below.

2.2 Correspondence of Satellite and LOWTRAN 6 Radiance

NOAA-6 and NOAA-9 satellite data from the Advanced Very High Resolution Radiometer (AVHRR) imager were archived during the period 15-18 April (see Table 4) from which the upwelling radiances observed at satellite position were determined. Subsets of these data are provided for the study region in Figures 1-5. These radiances were then compared to results of LOWTRAN 6 model calculations, by incorporating the boundary layer and free atmosphere contributions, as described in Section 2.1, for times matching the satellite overpass.

The satellite-observed radiance has been modeled for the viewing geometry of the polar-orbiting satellites determined from orbit parameters provided by the Scripps Satellite Oceanography Facility (SSOF). LOWTRAN 6 results were compared to satellite data by two procedures. First, spectral radiance from LOWTRAN at a specific central wavelength was matched against the equivalent-blackbody radiance of the satellite thermal channels. The central wavelength was chosen to be that at which the satellite channel calibrations had been performed, for the observed temperature range. AVHRR channel calibration is determined for monochromatic wavelengths only, and this is a central wavelength rather than the peak transmittance wavelength. For example, peak transmittance for NOAA-9 AVHRR Channel 4 is found at 10.50 microns, while radiance calibration is valid at 10.76 microns, near the center of the filter bandpass.

A second procedure was utilized for analysis of shortwave radiance, based on the channel calibration with respect to scene albedo over the entire bandpass. The LOWTRAN 6 filter function subprogram, LOWFIL, provided the means to estimate albedo.

To quantitatively test the observed and calculated radiances, the signal conversion procedure specified for AVHRR shortwave channels must be followed. A pre-launch laboratory calibration of the Channel 1 and Channel 2 sensors provides the following conversion for channel radiance, $L_{f\lambda}$;

$$L_{f\lambda} = \frac{A_\lambda \cdot E_{f\lambda}}{\pi}, \qquad (1)$$

where the albedo (A) of the satellite channel centered at wavelength λ is given by a linear relationship to pixel brightness, and $E_{f\lambda}$ is the sensor-weighted solar irradiance on a horizontal surface at the top of the atmosphere. $E_{f\lambda}$ was obtained by integrating solar irradiance with the channel filter functions (transmittance curves) in narrow wavelength intervals across the filter bands (0.53 - 0.80 μm for Channel 1, 0.69-1.125 μm for Channel 2). For the LOWTRAN radiance 0.15 $mWcm^{-2}sr^{-1}$, Channel 2 pixel albedo should be 2.4%. Satellite-observed albedos at the location and viewing geometry for which the model calculations were performed (on the morning of April 18, directly off Pt. Loma in the area shown by Figure 6) equal only 1.7%. The satellite image albedos are also less than predicted values for Channel 1, and at other image times deviations of up to 1% also are noticed. Table 5 lists Channel 1 and 2 albedos at the study location observed by NOAA-9 and calculated by LOWTRAN. Images corresponding to the three individual cases are presented in Figures 2d, 7 and 8. For the April 16 case, observed satellite radiances for Channel 2 lie in the visibility range where aerosol type (marine vs. continental) has only a small impact on extinction. The location of the value of observed radiance would lead to a visibility estimate from the plotted curves similar to that which was recorded. Again, however, the data used to plot these curves would require

a high relative humidity to produce this value. Sensitivity of model results to ocean surface albedo is not sufficient to account for the difference. Although the source of the deviation could be due to instrument response or model error, it is small in magnitude. The values of the bi-spectral brightness ratios are consistent between model results and satellite data. The ratio of scaled radiances in Channels 1 and 2 can be evaluated from the satellite data as the ratio of albedos in Channels 1 and 2. Following Eqn. 1, the value of $A_{\lambda 1}/A_{\lambda 2}$ would be expected to increase with the predominance of continental aerosol for a given value of optical depth. The ratio $(DR_{\lambda 1}/DR_{\lambda 2})$ for the NOAA-6 April 18 morning satellite pass time case is 1.30 from satellite data alone and 1.37 from model calculations, showing agreement within 1% for the ratio value.

Calculations of narrow-band radiance in the longwave channels also demonstrate agreement between LOWTRAN 6 and calibrated AVHRR data. For each of the satellite chanels, the digital pixel brightness is directly related to an equivalent-blackbody temperature. The radiance associated with this value is recovered simply by using the Planck blackbody function. Pixel radiance values may be expected to equal upwelling radiance computed from the transmission model, assuming the viewing geometry and meteorological parameters are accurately specified. The NOAA-9 Channel 4 calibrated radiance at the Pt. Loma Waypoint #1 on April 16 (satellite image is enhanced to emphasize haze in Figure 4d) was 0.79 $mWcm^{-2}sr^{-1}$, while LOWTRAN 6 calculations for the same waveband produced approximately 0.74 $mWcm^{-2}sr^{-1}$ (see Table 2). Variations in the viewing geometry within the area, from Waypoint #1 to #9 (a distance of 0.25 degrees longitude) amount to only 0.1% of the calculated radiance. Another case study, on the afternoon of April 17, again showed NOAA-9 Channel 4 radiance (0.80 $mWcm^{-2}sr^{-1}$)

within 4% of model radiance ($0.77\ mWcm^{-2}sr^{-1}$). Enhanced imagery for this case is displayed in Figure 10. Results for Channels 3 (3.7 µm) and 5 (11.8 µm) are given in Tables 6 and 7.

It was determined from the results of many LOWTRAN output comparisons that the incorporation of accurate sounding profiles above 500 mb was not significant to the accuracy of these case studies. Estimation of surface relative humidity and surface winds are critical in predicting the concentration of haze droplets. The uncertainty in sea surface temperature is unimportant, as discussed below.

The parameterization recommended by NOAA (Kidwell, 1985) for daytime determination of sea surface temperature (SST) from the AVHRR digital image data utilizes the Channel 4 (10.76 µm center wavelength) and Channel 5 (11.85 µm center wavelength). For example, using NOAA-9 AVHRR data,

$$SST\ (^{o}C) = 3.6569\ T_4 - 2.6705\ T_5 - 268.92, \qquad (2)$$

where T_4 is the calibrated equivalent-blackbody temperature (in degrees Kelvin) for Channel 4, and T_5 is that for Channel 5. The difference in brightness temperatures between these two channels is a measure of atmospheric moisture. T_5 is less than T_4 under normal circumstances. From SST measured at Pt. Loma, observations during the period 15-17 April ranged 62°F (17°C) to 68°F (20°C). Upwelling radiance defined merely by equivalent-blackbody temperatures varies by a few percent across this range, but radiance leaving the atmosphere from an ocean surface with this temperature variation is relatively constant. Comparing the satellite-derived SST for NOAA-9 pass times on April 17 (Figure 10) and April 18 (Figure 11), a variation of only 0.6°C is noted. At the same conditions, LOWTRAN estimates show Channel 4 radiances to vary from 0.77 to

0.87 $mWcm^{-2}sr^{-1}$. This is assumed to caused by the 24-hour change in boundary layer haze conditions due to modification of the air mass through windspeed fluctuations, relative humidity changes, or alteration of the specified aerosol origin. The observed or probable SST fluctuations would not produce changes of this magnitude in the satellite channel radiances.

2.3 Image Analysis

Modifications to the marine haze layer are manifest in the results of LOWTRAN 6 radiance calculations at visible, near-infrared and thermal wavelengths simultaneously, through changes in the size-dependent number concentrations and extinction properties of aerosol.

The comparisons of satellite radiances in the shortwave and longwave channels to LOWTRAN calculations that weredescribed in the previous section show that the model provides sufficient accuracy and sensitivity to study image patterns produced by haze variations. The LOWTRAN results also display smooth variation with zenith angle toward the horizon (except very near 0° elevation), as shown in the solid lines of Figure 12. Unfortunately, narrrow-band radiometric observations taken simultaneously by the Spectral Radiometer located at Pt. Loma were too noisy (vertical bars) to draw any definite conclusions on a correspondence to model results. The interrelationship of horizontal path transmittance to upwelling radiance variations should be explored further. Time-series studies of enhanced GOES and NOAA satellite data from the field projects reveal areas of haze for which the horizontal transmittance could be measured from a ship-based or land-based filter radiometer.

3.0 SATELLITE OBSERVATIONS OF MARINE BOUNDARY LAYER CLOUDS

Research under this topic has been described in the two papers previously submitted (Wetzel and Vonder Haar, 1986a, 1986b), and will be summarized below. It is evident from routine satellite imagery that marine stratus cloud is maintained over large regions by synoptic-scale forcing, but that convective motions on the cloud scale are also necessary. Local energy budgets are therefore a critical factor in governing cloud development and dissipation. The growth of haze droplets due to radiative cooling may lead to cloud formation, and the absorption of solar energy by cloud contributes to the net energy balance in rising parcels at cloud top. The size of droplets with these cloudy parcels determines both their radiative and microphysical interactions with the environment.

A technique proposed for determination of cloud droplet size parameters, using satellite remote sensing, employs the shortwave bands where water vapor absorption is small. The results of multiple scattering radiative transfer calculations demonstrate that directional reflectance in the NIR vapor window at 1.6 μm, for example, is reduced measurably when the effective radius of the cloud layer droplet population is increased. The effective radius is a ratio of volume-weighted to cross-section-weighted number concentrations for cloud droplets, which provides a parameter that scales the relationship of droplet absorption versus scattering processes.

It is suggested that a satellite sensor designed for this application should provide NIR window radiances simultaneously in at least two channels, with one near the visible (0.85 μm) to estimate the scaled optical depth of the stratus layer. Figure 13 shows the direct relationship of scaled optical depth to 0.85 μm reflectance, while Figure 14 is an example

of how 0.85 μm reflectance can then be used to discriminate the 1.6 μm reflectance variations due to droplet size. Several tests have been carried out with the multiple scattering model to simulate remote sensing of multi-layer clouds. The optical depth, droplet characteristics near cloud top, and viewing geometry all are significant factors of cloud reflectance, but can be separated through numerical experiment. We have also designed and field-tested a remote sensing system to measure spectral radiance in the NIR windows centered at 0.85, 1.6, and 2.2 micron wavelengths. The schematic design of the Discrete Filter Wheel implemented for this study is shown in Figure 15. The Spectral Radiometer System was operated as part of cloud microphysics-radiation experiments in collaboration with NOSC during April and June, 1986. Data from the June aircraft flights show the cloud-scale fluctuations in upward-directed spectral radiance expected in the shortwave bands. Analysis of the data sets for reflectance signatures that are related to microphysical conditions in ongoing. An example of the raw data captured during the research flights in June is presented in Figure 16, where the vertical scale is proportional to measured radiance in each channel, and the horizontal scale represents fractions of seconds along an aircraft flight leg. A complete study of the results from the summer experiment will include combined evaluation of the satellite, radiometer and microphysical data sets.

Digital imagery available from a DMSP Special Sensor C (SSC) experiment during a short period in 1979 provides the only satellite observations of clouds in a near-infrared window band. Figure 17 is an example set of images in the visible, near-infrared (SSC), and thermal window for an ocean region off the East Coast. The ability of multi-spectral techniques to discriminate low water cloud from ice cloud is obvious by comparing the

brightness of the three images for the high frontal cloud band in the center of the image. The value of the Special Sensor image for studying the stratocumulus cloud field near the top of the image is not obvious. While the radiative transfer calculations indicate cloud reflectance should be lower for the SSC than the visible channel, the effects due to coarse resolution and broken cloud fields are difficult to assess. Remote sensing studies from aircraft should be continued for the stratus applications, particularly because these simultaneously provide the aerosol/droplet sampling, as well as the radiometric observations at higher resolution than satellites currently allow.

4.0 SUMMARY AND RECOMMENDATIONS

The research project during the past year has allowed us to extend th results of previous studies on satellite applications, particularly with regard to intercomparison with standard atmospheric transmittance models. It has also been possible to study the basis of a new technique for characterizing marine layer clouds, so that their evolution may be related to the near-cloud environmental parameters. A wider range of meteorological scenarios must be routinely sampled with the radiometric instrumentation available and coincident satellite-based imagers to allow improvement of and reliance on the numerical models during image interpretation. The multiple-scattering radiative transfer methods can then be meshed with LOWTRAN to provide cloudy-clear air analyses.

5.0 ACKNOWLEDGEMENTS

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TABLES

TABLE 1. Data Set for LOWTRAN Model Calculations

Data Source	Description	Date/Time(GMT)
NOSC	Vertical profiles from ship-launched balloons, near Pt. Loma	16 Apr 86/0345 /1645 /2045 17 Apr 86/0045
NWS	12-hourly rawinsonde profiles from Montgomery Field	15 Apr 86/1200- 19 Apr 86/0000
NOSC	Pt. Loma surface observations (inc. sea surface temperature)	15 Apr 86/2230- 16 Apr 86/0510
		16 Apr 86/1530- 16 Apr 86/1700
		16 Apr 86/2000- 16 Apr 86/2100
		16 Apr 86/2345- 17 Apr 86/0130
NWS	Hourly surface observations at San Diego, Lindbergh Field, San Nicholas Island and North Island	15 Apr 86/1200- 19 Apr 86/0200

TABLE 2. LOWTRAN Model Parameters and Results for the 10-11 µm band.

Time (GMT)	Surface Relative Humidity (%)	ICSTL (n.d.)	Current Wind Speed (m/s)	24-hour Average Wind Speed (m/s)	Visibility (km)	10.76 µm Radiance ($mWcm^{-2}sr^{-1}\mu m^{-1}$)
0045	* 50	1	10.3	7.7	32.7	0.75
(17 April)	60	1	10.3	7.7	27.0	0.74
	60	1	9.8	7.7	28.1	0.75
	60	1	7.7	7.7	33.4	0.76
	60	1	1.7	7.7	66.0	0.80
	60	1	10.3	5.1	31.9	0.74
	60	2	2.6	7.7	57.3	0.80
	60	3	10.3	7.7	24.8	0.74
	60	5	9.8	7.7	21.8	0.75
	65	2	7.7	7.7	29.3	0.76
	70	1	7.7	7.7	28.2	0.76
	70	2	7.7	7.7	26.8	0.76
	75	2	7.7	7.7	24.8	0.75
	98	1	10.3	7.7	2.9	0.47
2045	* 50	2	10.3	6.2	34.6	0.74
(16 April)	65	1	10.3	6.2	27.1	0.73
	65	2	10.3	6.2	26.1	0.73
	75	2	7.7	7.7	24.8	0.75
1645	* 65	1	4.6	6.2	50.1	0.77
(16 April)	75	1	4.6	6.2	43.1	0.77
	85	1	4.6	6.2	38.8	0.77

Notes: Upper air temperature and humidity data obtained from radiosonde ascents for 16 April 1986. Parameter lists marked by an asterisk(*) represent observed surface conditions of relative humidity, ICSTL, and winds for the time period indicated. Calculated visibilities are greater than those measured at 1645 GMT (18.5 km), 2045 (27.7 km), and 0045 (18.5 km).

TABLE 3. LOWTRAN Model Parameters and Results for NOAA-9 AVHRR Channels 1 and 2

Time (GMT)	Channel Number	Surface Relative Humidity (%)	ICSTL (n.d.)	Current Wind Speed (m/s)	24-hour Average Wind Speed (m/s)	Visibility (km)	Filter-Integrated Radiance ($mWcm^{-2}sr^{-1}$)
0045	1	60	1	10.3	7.7	27.1	0.163
(17 April)	1	60	2	7.7	7.7	32.0	0.158
	1	60	5	10.3	7.7	21.2	0.171
	1	75	2	7.7	7.7	24.8	0.166
	2	60	1	1.7	7.7	66.0	0.104
	2	60	3	10.3	7.7	24.8	0.141
	2	60	5	10.3	7.7	21.2	0.147
	2	60	5	7.7	7.7	24.9	0.137
	2	60	5	1.7	7.7	39.5	0.113
	2	70	1	10.3	7.7	26.8	0.139
	2	70	1	7.7	7.7	28.1	0.137
	2	70	1	7.7	10.3	23.7	0.145
	2	70	1	5.1	10.3	29.7	0.134
	2	70	5	10.3	5.1	19.5	0.150
	2	75	2	7.7	7.7	24.8	0.142
	2	80	5	10.3	7.7	14.4	0.170
	2	95	1	10.3	7.7	10.1	0.202
	2	95	5	10.3	7.7	6.3	0.215
	2	98	1	10.3	7.7	2.9	0.239
	2	98	5	10.3	7.7	1.5	0.247

TABLE 4. NOAA AVHRR Data Archived For April Experiment

Satellite	Date/Time(GMT)
NOAA-9	April 15/2227
NOAA-6	April 16/0246
NOAA-9	April 16/2216
NOAA-6	April 17/1442
NOAA-9	April 17/2205
NOAA-6	April 18/1418
NOAA-9	April 18/2155

TABLE 5. LOWTRAN model parameters and results for NOAA-9 AVHRR Channels 1 and 2

Time (GMT)	Channel Number	Surface Relative Humidity (%)	ICSTL (n.d.)	LOWTRAN Albedo (%)	Satellite Albedo (%)
2227	1	70	1	3.2	3.0
(15 April)	2	70	1	2.0	1.0
2216	1	75	2	2.9	3.4
(16 April)	2	75	2	1.9	2.1
2205	1	50	1	2.0	3.2
(17 April)	2	50	1	1.3	1.7

TABLE 6. LOWTRAN Model Parameters and Results for NOAA-9 AVHRR Channel 3.

Time (GMT)	Surface Relative Humidity (%)	ICSTL (n.d.)	Current Wind Speed (m/s)	24-hour Average Wind Speed (m/s)	Visibility (km)	3.73-µm Radiance ($mWcm^{-2}sr^{-1}\mu m^{-1}$)
0045	60	1	10.3	7.7	27.0	0.027
(17 April)	60	1	5.1	7.7	43.5	0.028
	60	5	10.3	7.7	21.2	0.027
	80	1	10.3	7.7	19.7	0.026
	95	1	10.3	7.7	10.1	0.022

Note: Satellite radiance for 2216 GMT (16 April) pass is 0.026 $mWcm^{-2}sr^{-1}\mu m^{-1}$ at Way Point #1 near Pt. Loma.

TABLE 7. LOWTRAN Model Parameters and Results for NOAA-9 AVHRR Channel 5.

Time (GMT)	Surface Relative Humidity (%)	ICSTL (n.d.)	Current Wind Speed (m/s)	24-hour Average Wind Speed (m/s)	Visibility (km)	11.8-µm Radiance ($mWcm^{-2}sr^{-1}\mu m^{-1}$)
0045	50	2	5.1	7.7	49.7	0.75
(17 April)	60	1	10.3	7.7	27.0	0.72
	60	5	10.3	7.7	21.2	0.71
	80	1	10.3	7.7	19.7	0.70

Note: Satellite radiance for 2216 GMT (16 April) pass is 0.72 $mWcm^{-2}sr^{-1}\mu m^{-1}$ at Way Point #1 near Pt. Loma.

FIGURES

Channel 1: Albedo(%) = (pixel value(shown below) * 0.297) + 2.53 Bandpass is 0.53 - 0.80 microns

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Image Column Number (columns); Image Row Number (rows)

Row	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329
245	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
246	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
247	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
248	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
249	4	3	3	3	3	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
250	5	6	4	4	3	3	3	3	2	2	1	2	2	1	1	1	2	2	2	1	1	1	2	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
251	15	11	9	4	4	3	4	3	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	1	1	1	1	1	1	1	1
252	24	25	23	23	6	5	4	4	4	3	3	3	3	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
253	8	15	21	21	6	5	4	4	4	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1
254	7	14	23	21	9	5	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1
255	7	14	30	25	15	7	5	4	4	4	4	4	3	4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1
256	5	10	20	20	14	6	5	5	4	4	4	4	3	3	3	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	3	1	1	1	1	1	1	1
257	5	9	16	18	16	9	6	6	5	5	4	4	4	4	4	3	3	4	3	3	3	2	2	3	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1
258	4	5	7	14	17	18	15	7	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	2	2	2	2	3	2	2	2	2	2	2	1	1	1	2
259	5	5	5	7	13	18	17	8	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	2	2	2	2	2	2	2
260	5	5	5	6	11	19	19	19	11	5	4	4	3	3	4	4	4	3	3	4	4	4	4	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2
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262	4	4	4	4	4	9	16	16	15	11	11	6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	2	2
263	4	4	4	4	4	4	10	16	17	16	15	12	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3
264	4	4	5	5	5	5	8	17	18	18	17	16	9	7	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2
265	5	5	6	6	5	5	5	14	18	18	17	16	11	11	7	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
266	5	5	5	5	5	5	4	14	16	18	18	17	14	15	12	4	3	3	3	3	3	3	4	4	4	4	3	2	2	3	3	3	3	3	3	4	4	4	3	3
267	5	5	5	5	5	4	4	9	14	18	17	17	16	16	16	15	6	4	3	3	3	3	3	4	3	3	3	3	2	3	4	4	4	4	5	5	4	4	3	3
268	5	5	5	5	5	5	5	6	6	12	17	16	17	18	17	16	11	6	3	3	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	4	4	4
269	5	5	5	5	5	5	5	5	6	12	17	17	18	18	17	16	14	10	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	4
270	5	5	5	5	5	5	5	5	5	6	16	18	18	18	16	16	16	16	6	7	5	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	4	4	4
271	5	5	4	4	4	5	5	5	5	5	8	15	19	17	18	17	18	19	13	14	7	4	4	4	4	4	4	4	4	4	4	4	5	5	6	5	5	4	4	4
272	4	4	4	4	4	5	5	5	5	5	6	8	14	18	19	18	18	18	18	11	15	11	3	4	4	4	4	4	4	4	4	4	4	6	6	5	5	4	4	4
273	4	4	4	4	4	5	5	5	4	5	5	5	5	8	11	17	19	12	7	4	5	6	3	4	4	4	4	4	4	4	4	4	4	4	6	6	4	4	4	4
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278	4	4	4	3	3	3	3	4	4	4	4	4	5	5	4	4	4	4	3	4	3	3	3	3	3	3	3	3	5	8	3	3	3	3	3	3	3	3	3	3
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285	3	3	3	4	3	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3
286	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	3	3	3
287	3	3	4	4	3	3	3	2	2	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	3	2	2
288	3	4	4	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2
289	4	3	3	3	3	3	2	2	3	3	3	4	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	5	3	3	2	2	2	2	2	2
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291	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	2	2	2	3	3	3	3	3	3	3	3	3	2	2	2	2	3	5	2	2	2	1
292	4	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2	3	11	3	2	2
293	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	3	3	4	2	2	2
294	3	2	3	3	3	3	3	3	3	3	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
295	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
296	2	2	2	2	2	3	3	3	3	3	3	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2
297	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
298	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	2	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
299	2	1	1	1	1	2	1	2	2	1	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
300	1	1	1	1	1	1	1	1	2	1	2	2	1	1	1	1	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
301	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Fig. 1. NOAA-9 satellite image data in three adjacent areas between San Clemente Island (in upper left of panel (a), above, and San Diego coastline (right edge of Fig. 1(c)). Channel 1 data shown.

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	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369
245	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
246	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
247	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
248	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
249	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
250	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
251	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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253	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
254	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
256	1	1	1	1	1	2	2	2	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
257	1	1	1	1	1	1	2	2	1	1	6	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
258	1	1	1	1	1	1	1	2	1	3	1	2	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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260	2	2	2	2	2	2	3	4	2	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
261	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
262	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0
263	2	2	2	2	2	2	2	2	3	2	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0
264	2	2	2	4	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
265	3	3	2	2	2	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0
266	3	3	3	2	2	2	2	2	2	1	2	2	3	3	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0
267	3	3	3	3	3	2	3	3	3	2	2	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0
268	4	4	4	4	4	3	3	3	3	3	3	3	3	2	2	2	2	2	3	3	3	2	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
269	4	4	4	4	3	3	4	3	3	3	4	4	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
270	4	4	4	4	4	4	4	4	4	4	3	3	4	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
271	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1
272	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	3	3	3	3	3	3	2	2	2	2	2	2	1	1	2	1	1	1	1	1
273	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	2	2	2	2	2	1	1	1	1	1	1	1
274	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	3	3	4	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	1	1	1
275	4	4	4	4	4	4	4	3	3	3	3	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	1	1
276	4	4	4	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	1
277	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	2	2	2	1
278	3	3	3	3	3	3	3	3	3	3	4	4	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	1
279	3	3	3	3	3	3	3	3	3	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2
280	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	2
281	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	3	3	3	2	2	2	3	2	2	2
282	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
283	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
284	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
285	3	3	3	3	3	4	9	10	3	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
286	3	3	3	3	3	4	6	13	6	18	9	3	4	4	4	3	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2	1	2	2	2	2	1	1
287	3	3	3	3	3	3	3	3	19	14	20	20	28	18	4	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
288	2	2	2	2	3	3	3	3	3	5	13	15	31	17	6	3	3	3	2	2	2	1	2	2	2	2	2	2	2	2	2	1	1	2	2	2	1	1	2	1
289	2	2	2	2	2	3	3	3	3	3	3	3	3	16	11	2	2	3	2	2	2	2	2	1	2	2	1	1	1	1	1	1	1	2	1	1	1	1	2	2
290	2	2	2	2	2	2	2	2	3	2	2	2	2	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	2
291	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
292	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	2
293	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	2	2	2	3	3	3	3	3	3
294	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	4	4	2	1	2	2	2	2	2	2	2	3	3	3	3	3
295	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	7	3	2	2	2	2	2	2	2	2	2	2	2	2	2
296	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2	1	1	1	1	1	2	2	2	2	2	2	2
297	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2	2	1	1	1	1	2	2	2	2	2	2	2
298	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10	5	3	2	2	2	3	2
299	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	14	15	6	2	3	3	3	2
300	3	3	3	2	2	4	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	3	3	3	3	3	3	4	6	5	3	3	2	2
301	2	3	2	3	4	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	4	9	12	3	2	2	2

Fig. 1(b). Channel 1 central panel, between San Clemente Island and San Diego.

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	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409
245	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	9	20	20	17	16	22	24	29	27	13	13
246	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	7	21	21	18	21	25	26	22	14	14
247	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	5	24	26	24	24	24	24	23	18	15
248	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	4	25	29	28	29	22	21	19	15	15
249	0	0	0	0	0	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	4	23	25	25	24	24	20	21	18	17
250	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	22	24	23	28	18	18	20	20	18
251	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	3	1	1	1	1	21	24	22	18	17	16	16	17
252	0	0	0	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	3	1	1	1	1	15	20	20	17	16	15	15	19
253	0	0	0	6	7	4	3	1	5	0	0	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	5	4	2	1	1	1	14	16	18	17	16	14	16	23
254	1	0	0	1	2	2	1	4	1	0	1	1	2	1	8	9	3	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	19	22	21	18	16	16	18	22
255	0	1	1	0	1	1	1	0	1	1	1	1	2	6	25	26	8	2	1	0	1	1	1	1	1	6	1	1	1	1	1	1	19	23	23	18	19	18	19	19
256	0	0	0	0	0	0	1	0	0	1	0	0	1	19	5	11	6	4	4	1	1	1	3	4	7	2	2	3	1	1	1	1	22	22	28	22	19	17	20	22
257	0	0	0	0	0	0	0	0	0	0	1	0	1	5	3	11	4	4	3	1	1	1	1	2	3	1	5	5	4	1	1	1	1	17	17	18	26	36	24	18
258	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	1	3	1	1	1	1	1	2	3	2	7	2	1	1	1	1	1	19	19	28	41	30	18
259	0	0	0	0	0	1	1	0	1	0	0	1	1	1	1	4	1	2	2	1	0	0	0	2	4	3	2	5	3	1	1	1	1	1	19	20	28	28	22	19
260	0	0	0	0	0	0	1	0	1	0	0	0	0	1	4	4	6	0	1	1	0	0	0	0	4	4	1	3	2	1	1	1	1	1	16	21	31	15	15	17
261	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	2	1	1	0	1	1	1	1	1	6	1	2	1	1	1	1	2	14	16	20	18	14	14
262	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	1	1	1	4	8	1	1	2	1	1	1	1	1	3	16	15	19	16	15
263	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	3	3	1	1	1	1	1	1	1	1	2	19	19	20	23	23
264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	3	20	19	19	23	27
265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	4	22	17	22	25	20
266	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	5	20	22	22	21	18
267	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	3	3	12	21	30	24	20
268	1	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	8	11	19	20	27	20	21
269	0	1	1	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1	5	23	17	16	18	19	19	20
270	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	5	20	17	17	18	19	23	25
271	1	1	1	1	1	0	0	0	1	0	0	0	0	1	0	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	8	19	19	20	21	23	23	23
272	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	7	23	24	22	23	23	24	23
273	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	21	28	26	25	24	23
274	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	19	27	27	24	24	21
275	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	13	14	19	16	22
276	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	2	16	14	12	22	26
277	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	2	19	14	15	23	25
278	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	22	22	21	21	29
279	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	5	28	25	23	26
280	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	11	24	24	26	27
281	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	14	21	24	24	7
282	2	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	2	2	5	16	16	15	9	7
283	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	2	1	8	16	10	11	23	23
284	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	2	2	6	9	15	10	26	32
285	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	7	14	14	24	26
286	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	2	2	2	2	2	3	3	6	13	4	4	4
287	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	5	8	4	4	4
288	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
289	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	2	2	2	2	2	3	3	3	2	3	3	3	3
290	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
291	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2
292	2	2	3	3	3	3	1	1	2	1	1	1	1	2	2	2	3	3	2	2	2	4	3	2	4	1	2	2	2	2	1	1	1	2	2	1	1	1	1	1
293	3	2	3	3	3	3	3	2	2	2	2	2	2	2	3	3	4	4	3	2	2	3	2	3	4	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1
294	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1
295	2	2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
296	2	3	3	2	3	2	3	3	3	3	3	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
297	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
298	3	2	3	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	8	2	1	1	1	1	1	1	1	1	1	1	1	1	1
299	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	3	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
300	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	4	2	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
301	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1

Fig. 1(c). Channel 1 eastern panel, with San Diego coastline on right edge.

Channel 2: Albedo(%) = (pixel value * 0.292) + 1.50

Bandpass is 0.69 - 1.125 microns

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	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329
245	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0
246	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
247	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
248	3	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
249	4	3	3	3	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
250	5	5	4	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
251	27	17	12	5	4	3	3	3	2	2	2	3	2	2	2	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
252	41	41	39	39	8	5	5	4	4	3	3	3	3	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
253	8	24	39	42	10	6	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
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Fig. 2(a) As in Fig. 1, for Channel 2 data.

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	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369
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291	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1
292	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1
293	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3
294	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	2	4	4	2	1	1	1	1	1	1	1	2	2	2	2	3	3
295	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	7	2	1	1	1	1	1	1	1	1	1	2	1	1	1
296	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
297	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
298	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	10	5	2	1	1	1	2	2
299	2	2	2	1	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	14	15	6	2	2	2	2	1
300	2	2	2	2	2	3	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	3	2	2	2	3	6	5	2	2	1	1
301	2	2	2	2	4	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	8	12	3	1	1	1

Fig. 2(b). Channel 2, central panel of image area.

N-9 APRIL 16 2214Z CH.2

	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409
245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	11	45	45	44	43	49	50	50	50	43	44
246	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	8	48	49	49	52	51	54	49	43	43
247	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	7	47	54	51	47	49	53	53	46	42
248	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4	46	51	51	48	46	50	52	45	46
249	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3	43	48	49	44	48	48	51	50	48
250	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	40	46	46	50	47	51	52	52	50
251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	36	46	47	47	48	48	49	51
252	0	0	0	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	1	1	1	23	39	42	49	45	43	42	50
253	0	0	0	6	7	4	3	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	1	1	1	1	23	35	40	47	44	43	44	50
254	0	0	0	1	2	1	1	4	1	0	1	1	1	0	8	9	2	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	29	44	46	49	46	49	60	52
255	0	0	0	0	0	0	0	0	1	0	0	0	1	6	25	27	8	1	1	0	0	1	0	0	1	7	0	0	0	1	1	1	30	44	49	48	52	59	40	60
256	0	0	0	0	0	0	0	0	0	0	0	0	1	20	5	11	6	4	3	0	0	0	3	4	7	2	1	3	1	1	1	1	29	29	45	53	50	46	48	51
257	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	11	4	3	3	0	0	0	1	1	3	1	5	5	4	1	1	1	1	31	41	46	47	55	48	45
258	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	2	0	0	0	0	0	1	3	1	7	2	1	1	1	1	1	35	42	47	58	52	45
259	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	1	2	1	1	0	0	0	2	4	3	1	5	3	1	1	1	1	0	33	42	47	52	49	53
260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	6	0	0	0	0	0	0	0	4	4	1	3	1	1	1	1	1	1	30	43	52	40	46	55
261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	6	1	1	1	1	1	1	1	30	40	46	43	45	50
262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	4	7	1	0	1	1	1	1	1	1	1	39	43	41	52	53
263	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	1	1	1	1	1	1	49	48	44	52	53
264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	50	46	45	50	52
265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	47	44	48	49	49
266	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	6	43	44	48	43	43
267	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	18	43	46	49	45
268	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	11	18	38	43	49	43	43
269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	45	47	43	45	45	47	46
270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	51	49	45	45	46	46	45
271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	10	47	46	47	45	46	48	42
272	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	10	42	46	46	44	45	43	46
273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	29	45	46	44	44	46
274	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	22	37	39	41	44	32
275	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	12	16	27	18	38
276	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	18	20	18	32	42
277	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	21	21	23	35	42
278	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	31	31	34	33	37
279	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1	1	5	43	43	41	45
280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	3	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	14	45	43	44	36
281	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	1	1	1	1	1	3	23	42	39	35	7
282	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	1	1	1	1	1	6	31	31	19	9	7
283	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	2	1	0	1	1	1	1	0	12	34	14	13	25	25
284	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	6	14	32	13	31	35
285	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	10	32	17	30	34
286	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	8	26	3	3	3
287	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	6	12	3	3	3
288	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	2	1	1	1	1	2	2	2	2	2	2	1	1	2	2	2
289	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	1	1	1	1	1	1	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1
290	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
291	1	1	1	1	1	1	1	1	1	1	[illegible]	1	1	1	1	1	1	1	1	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
292	1	1	2	3	3	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	3	2	1	4	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
293	2	2	2	3	3	3	2	2	2	1	1	1	1	1	3	3	3	3	2	1	1	3	1	2	4	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
294	3	3	3	3	2	2	3	3	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
295	2	2	2	2	3	2	2	2	3	3	3	3	3	3	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
296	2	2	2	2	2	2	2	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
297	2	2	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
298	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0
299	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	4	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
301	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig. 2(c). Channel 2, eastern panel.

241 496 141 396 1.0 1.0 1 1 N9106PM2E.IMG N-9 ENHANCED CHANNEL 2

Fig. 2(d) Enhanced satellite image, showing area of three adjacent panels in the Fig. 2(a)-2(c) in center, and surrounding region.

Channel 3: Equivalent-blackbody temperature (deg Celsius) = (pixel value * 0.245) -13.74

Bandpass is 3.44 - 4.03 microns

N-9 APRIL 14 22142 CH.3

	290291292293294295296297298299300301302303304305306307308309310311312313314315316317318319320321322323324325326327328329
245	122122124125124122122122122122124124124124124123121122121122124124123123123123122123123123122121121122122122121121117118
246	121121122123123124122121121121121122123124124124121122121122123124124123123122122123122122121119121122122122122120120120
247	121121121121123124122122122121121121124124123124120121121122124124124122121122121122122124122120121119121122122121122121
248	120119120119121122121121120120120121124124124122121122121121122124122120120120121122123122122121120120120122122121121121
249	118117118118119119120120119117120121122123123123122123123122122122123124122121123121122121122121120119121122122120120120
250	119118117117119118119120120120120120122124125125121120121121123123123123125119120122123121121120119120122122122121121121
251	156142134118117118119118118118119119121121120120121120121121122123121122122121122122123121121120120121121121123121121122
252	171174170170125119119119120119119118121122122123121121122121121121121120120121121121122121122122121119121122122122122
253	115137164166125119121120120118118119120120121121121120121119121120121122120121120120122121121121120120120121122122121121
254	117127160165135122120119119119119118119121122122121120122120120121124121121121121123121122122123121121122122123123122127
255	117127169174153129120118117118118118119121121121120119121121120120121122122120120122121121122122122121121121121123122121
256	117121160166145126119117117118119118120120121119119120119118118120121122122120120120121121121122126121122122122122123121
257	118122155164154138119119117118119120119121122121120119119120119120121122122122120120121120121121122122121121121122122121
258	120117115139162154147127118119120120120122121120119119119120120120120122120120121120121121122122121121120121121122
259	116117115115143155152132119120120121119118120121121121121120120119119122121121120121121121121122121121121120120121121122
260	118118115114130165164161137122120117120121121121121121120119119118118119120121121120120121122122121121122121120120120121123
261	118117118117116132165159146131120120120120121122122122121120119120118120120121121120119120121124121122121120120119121122
262	117117119117115126162159150143143126119120120120121121121121121121121119119118120121121122120119119121123121122121119119120122122
263	117119118117117115128146165154158148122120119120122122120120118118117120121121121120119120119122121122120120120121121121
264	119118117119118114120165175163162160135133120120122122121120119120119120121122121120119121121121121121122120119120120122
265	117118118118116115113144176170160159144143130120122121120120119118118120120120120121120119120120120121121119118119119120
266	118119118119118117116144157166162154147149141120121121120120120119119119119120120119120119121120120118118118118119
267	117117119119117116116126144164165163151136156154131123122120120119120119120120121121120120119119120120121118118118119119
268	119120120120118117118118116136171166164170168161151132121120119118118118119119121121120119119120120120119120119119118119
269	119120120120120118116117118133171171170173174175164153122122119118119118119121119119119118118118120120119119119118118117
270	120120120119121120119119118118163174174173175175175174133135121119120119119119120120119118118118118121121120117118118118
271	119119119121121120119119117120122150174174182178178176162171136119119119119119119119120119120120119121122120119117118117
272	119118120121121119118118119119120121148178183175176179179142166165120119118119119120121119119120120126126121121118117117
273	119120121120121120118118119120121119119125130163174158129123123127121120119119120120120119121120120120126125120119118118
274	120120121120121120120119118120120122121120122141134122123123121121122121119122120120121121121120120119120120120119118118
275	120119119120119119119118120120120121120117117117118120122122120121121121122122120120120121120118119119119122121121119119
276	120121120120120121120119119120121121120119121119119119119120123122122122121121125125125122122120119119120122121120119118
277	119118119120120120120119120120120121121119120120118118120120124124123123121124122125134132121120119120120121120120119118
278	118120119120120119120120119118120121120119120120118120119122122122122123123124122123130141122122120120120121120120120119
279	119119118118120120120119118119120121122120120121121122121120122123123122122123122123124124123125122121121121120122120120
280	118118118119119119118119119120120118120122121119120122122122121122122122122122122122123123125125122123121121121122121119
281	119117119120117119120120119120119119122120120122121121120121121122123123122123120121122123126126124122124124124128128121
282	119117117118118120121121121121117120122121122121120121121123123124125125122122121120122124125126123120120120123123125121
283	117116113118118119120120121117119121121120120122122121120120121123123124123121120120122124125125124123122123124122123122
284	119118117119119121121120117115119118118118121120119120120120122123125125123121121120121121123125124122123123124122123122
285	119117118119119119121121121120119120120121121120119119119120122123124124123122121122120121121124123123123124123122124123
286	120120118119114117119118118120118118120120120120118119119119122122123123123121122121120122121124122121122122123124123124
287	121120117115117118118118120119117117119120121119120119120120121121123123123121122121122122123122125122122122122124124124
288	121119116118117118120119119118118120118121121119120120121120119122122122122123121121120121124124128122121122123124122124
289	120120117118118117119118120118119118117119120119119119119120120120122122123123121121120122127134128123120121122123120121
290	120119117117118117119120120120118118119119119120119119118118118120123124123121117122121122123123130125125122121120122121
291	121121119119117118118119119118119118119120121121118118119119120121122123123122121120121120121122124122125133121121121122
292	122120120120119118119120117118119118119119121120119118118119119121118120121121122119120119121121121122123124145123121123
293	120120121119119118118119117119119119120121121119119120121120119117120121123123122122119120120121123123126123124121121122
294	121121121119120117119119119120119120118117119119121119119118119119120121122122122121118119119121122121121122122123122121
295	119120120119119119118117120120121119117117119118119119117119119119119120121121122121119119117119120122121120119120121122
296	120122121120119118119119120120120118117117117118119120120119119119120120121121120120120121120121121121120120120121122121
297	120120120120119119120119119120119118119117118119120120119120120120120119120119120120119121120121122121121120120119119121
298	119118119119120119119119118118118118118116117117119119119119119119119120120120119120120120120120121121121121120120120121
299	119120121120121120119119119120119119119118118118120120119119118119119120120120120120121120121120121121120120120120120120
300	119120120120120119120118118118118119118116118118119119119118118119119119118120119121120120120119120121121121120119119118
301	119119120121120119120118118118118118120118118119117118119119119118118119119121122121120119120120121122120120119119119118

Fig. 3(a) As in Fig. 1, for Channel 3 data.

N-9 APRIL 16 22162 CH.3

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246 120120121121121120119119118117117119120121119119118120127121120119119117118117117118117116115115115115115116115117117117
247 121119120121122119118118118118119119119119119118119119119119121120118115115117118118117116116116115115115115115117117116
248 121120121121122121120119119117119118120120119119118119119121119120120119119117118117117117117116115115116116117117116116
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250 121120120121123122120119119118116118117118119119119118119118118119120120120119119120119120118118117116117117118119119118
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270 120119118119119119118116116117116117116117117116116117118119117118118118119119118119118120119119119120121120120118118119
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274 119118119119118118116117116117118118119116116116115117116118118117117117119121120119117118118118119119118121120119120118
275 119118120120119118117118118118119118117118117116115115117118117115117118118120118118119117117117118121120121119118117117
276 118120120120119119118117117119119119119116117119117119118119119119118118118118118117117118119118119120119121119118117117
277 119120120120118117117118118118118118117115117117117116116118119120118119119118118118118118118118119120121121118117117117
278 121121119119118118117118119119119119118117116117118116116116118118118119118118119118119118117117118120120121120118118117
279 119118119119120119119118119118117118117119119119119117116117119120119119118120121119119119119119119121120119119119118117
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301 120119120121125119119121118118117118118119118119119119119118118118115117117118119120119119120119119122141154119118120120
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Fig. 3(b). Channel 3, central panel.

N-9 APRIL 16 2216Z CH.3

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     370371372373374375376377378379380381382383384385386387388389390391392393394395396397398399400401402403404405406407408409
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247  115115115117117117119118120126120118118119118119116117118118118119119118117117119118119119127195194192189199191186178172
248  115115114115116117118118117116116118117118118118117117117119118118119118117117118118120118121202198201205199190182169169
249  115115116117116124121125120117116117117117118117117116117118118119118119119118118118119114121201199198207193193187182180
250  116116117116117117119119119118118117118118119117116115116118118119118119119118118119119118118189201197200178180186185185
251  119118117118117116118119119118117118118118118117117116117118118119119119119118118122120120119117191202192178190178177188
252  119117117126122121118121119118117117118117118117117116116117118118118118119118132132118119119118159183181177178173172190
253  119118118137146130127122140118118117117117119118118118117117117117119119119118131130121120119117164177181190175169177199
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257  120119116118118118118119120117118117117135124142128127124118117117119122122120134134129119119118118177177176197212189176
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259  119120119119118119118119119118117117117120119135121124125121117117118129134129123140124120119120119119179191205193187176
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301  119118119118118118118120119120119120119118118119119120119120120117118119120119133119113118118118118118117116116115114115
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Fig. 3(c). Channel 3, eastern panel.

Fig. 3(d). Enhanced satellite image for Channel 3, showing area of Fig. 3(a)-3(c) and surrounding region.

Channel 4: Equivalent-blackbody temperature (deg Celsius) = (pixel value * 0.340) - 47.80

Bandpass is 10.00 - 11.52 microns

N-9 APRIL 16 22167 CH.4

	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329
245	178	179	180	180	180	180	180	181	181	181	181	181	181	182	182	182	182	182	182	183	183	183	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182
246	177	178	179	179	180	179	179	180	180	180	180	180	180	182	182	182	182	182	182	183	183	183	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182
247	175	176	176	177	178	178	178	177	177	179	180	180	181	182	182	182	182	182	182	182	183	183	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182
248	173	174	175	175	176	176	177	177	178	178	178	180	180	181	181	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	181	182	182	182	182
249	167	170	171	173	174	172	174	176	177	178	179	179	180	181	181	182	181	182	182	182	182	182	181	181	181	182	182	181	181	181	182	181	181	181	181	181	182	182	182	182
250	164	165	166	169	169	169	171	172	176	177	177	177	178	180	180	180	178	180	180	181	181	181	179	180	179	180	181	180	180	180	180	181	181	181	181	181	182	182	182	
251	180	175	173	165	165	169	167	169	173	173	174	172	175	176	176	177	178	176	177	178	178	177	178	178	179	179	180	180	179	179	179	180	180	180	181	181	182	182	182	
252	184	187	186	186	166	163	163	165	167	171	171	172	172	173	175	176	175	176	177	177	177	178	176	177	178	177	178	179	178	178	178	179	180	180	180	181	181	182	182	182
253	154	170	132	181	163	162	165	166	167	169	169	170	172	173	174	174	174	174	175	175	175	175	175	176	176	176	176	176	178	178	178	178	179	181	181	181	181	182	182	182
254	154	162	176	180	167	164	165	164	164	167	168	166	168	169	171	171	171	173	174	174	174	174	176	176	176	177	177	177	178	179	179	180	181	181	181	181	181	182	182	181
255	154	165	183	187	175	166	163	163	164	166	166	166	168	168	168	169	170	172	173	173	173	174	175	176	177	177	178	178	178	179	180	180	181	181	181	181	181	181	181	181
256	160	168	185	189	176	167	161	162	163	165	165	166	167	167	168	167	169	169	171	171	173	174	175	175	177	177	178	178	177	178	178	179	179	181	180	180	181	181	181	181
257	164	169	183	188	182	172	162	162	162	163	165	166	167	167	168	168	158	167	170	171	172	174	175	174	175	176	177	177	177	178	178	178	178	180	179	179	180	181	181	180
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259	162	161	161	164	178	185	182	170	165	166	166	166	165	164	165	166	167	167	170	169	170	170	171	170	171	172	173	175	175	171	171	174	175	176	177	178	177	178	178	179
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265	158	158	159	159	161	162	162	180	195	191	188	188	181	177	173	170	170	170	158	167	169	170	171	173	171	173	173	173	172	172	172	172	171	172	172	171	171	171	173	173
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279	170	170	170	170	170	171	171	169	160	169	169	166	166	167	168	169	172	172	171	171	174	174	175	176	177	177	178	178	178	177	176	178	176	175	175	174	174	[illegible]	173	171
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301	178	178	178	178	178	177	177	177	177	177	177	177	176	176	175	175	176	177	177	177	177	178	178	179	178	178	178	177	177	177	177	177	177	177	176	176	176	176	176	176

Fig. 4(a). As in Fig. 1, for Channel 4 data.

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272 164163163164164165165165165166166166166165165166167167165166168169170171173173174175175174174176178178178179180180181182
273 163163163164165165165164165167167166166165165166166166166166167168169171172172173173174174175176177178178179179180181181
274 165164165166166166164167168168167167166165165166167167167168169169169171172172172171172175175174176176177176178179179180
275 166165167167167167167169169168168167166166166167167167168169169169167172172172169169170173173173174175176176177177178179
276 167167168169169169169170170168167167166167167167168168168167169169169170170170170171172173173173173175176175174174176179
277 169169169170170170170170168168167167167168168169169167169168168168169169169170172173173173173172175175173173175177179
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Fig. 5(b). Channel 4, central panel.

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	370371372373374375376377378379380381382383384385386387388389390391392393394395396397398399400401402403404405406407408409
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246	183183182182183183183183183183183182182183182183183183183183183183183183183183183184184183183189216217207210211207206207205
247	182182182182183182182183182182182183183183183183183183183183183183184183183183183183184183183183189216214212210216212212209206
248	182182182182182182182182183183183183183183183183183183183183183183183183184184183183183183187219216214216219214211207206
249	182182182182183182182182183183183183183183183183183183183183183183183183183184183183183184183186220219218222209210208211211
250	18318318318318318218218318318318318318318318318218318318318318318418418318318318418318421422021721220921021221 2212
251	183183183182183133183183183183183183183183183182182183183183184183184184184183182184184184183213219214209210209208214
252	183183183181182182182182183183183183183183183182182182183183183183183183184182182183184184183207210208209208206206215
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254	183183183183182182183181183183183183182183177177180182182182183183183183183183183183183183183183210222220211210210210214
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276	180180180180181182182183183183184183183183183183183183183183183183183183183184184185184185185184183183183202203207207220
277	179180180180181182182183183183183183183183183183183183183183183183183183183184184184184185184183183183200204212212218
278	179179179180180181181182182182183183183183183183183183183183183183183183183183184184184184185184183183185212212215218226
279	178178178179180181181181182182182183182182182182183182182183183183183183183183183184184184184184184183183182212212212221
280	177177178178179180179180181182182182181183182182183182181182182182183183183182183183183184184184183183184196220222223217
281	176176177178178179179180181182182181182183183183183182182182182182183183183183182183183183184183183183185201220222219194
282	176179179179178178179181181181182182182182183183183183182181182182183183183183183183183183183183183183187202209204196194
283	177179180180180180180180180181181182181181182182182183182182182182182182183182182183183183182182183187203197202217217
284	178179180180180180180179180181181181181181182182182182182182182182182182182182182183182182181181181178184198196218227
285	179179180179179180179179180181181181182182182182182182182182182182182182182181181182180180180179179179185197194206208
286	179179179179179180179179181181181182182182182182182182182182181181181180180180180180179179179178178179183192180179179
287	179179179180179179179181181181182182182182183182182182181181181181181181178179179179179179179179178178178178180183176176176
288	178178180180180180180181181181181182182182182182182182181180179179179178177178179179179178177177177178176179179178178178
289	178178179180180180180180180181181182182182181181182181181177177177178177176177178179178178178178178178179179179179179180
290	177178178179179179179179179180181181182181180181181180178176176176176177175175176178178178180180180180179180180179179180
291	176177177177177178178178178179179180181179179179178177174174175176177177178178178179179180181180180180180180180180180180
292	176177174171171173176177174178179180180176176175174173175177177177178179176179179179180181181181181181180181180180180181
293	173174174171171171172173174178178178177177172171172172174177178177178177176178179179181181183183182181181181181181180181
294	171171172172172173172172175174174174174174174176176176177178178177179179178179179179179182182183182182181181181181181181
295	175175174174173174174174172172172172172173177177177178178178179179178177179180180181181182182181181181181181181181181181
296	176175175175175175174172175175176176176176179179179179179179180179179180180182182181181181183183182182181181181181181181
297	176175176175174174174174175178178178178179180180180180180177181181181181181181181183183182183183183182182181181181181181
298	176176176178178178178177177179179179180180180180180180181180181182182182182179182183183183183183183182182181181181181181
299	178178178178178178178179177178179179180180180181181181181182182182181180183183183183183183183183182182181181181181181181
300	179179178178178178178178178178179180180181181181181181182182180181181182183182183183183183183182182181181181181181181181
301	173178178178178178178178179179179180181181182182182182182181182182182183183181183183183183182182182181181181181181181181

Fig. 4(c). Channel 4, eastern panel.

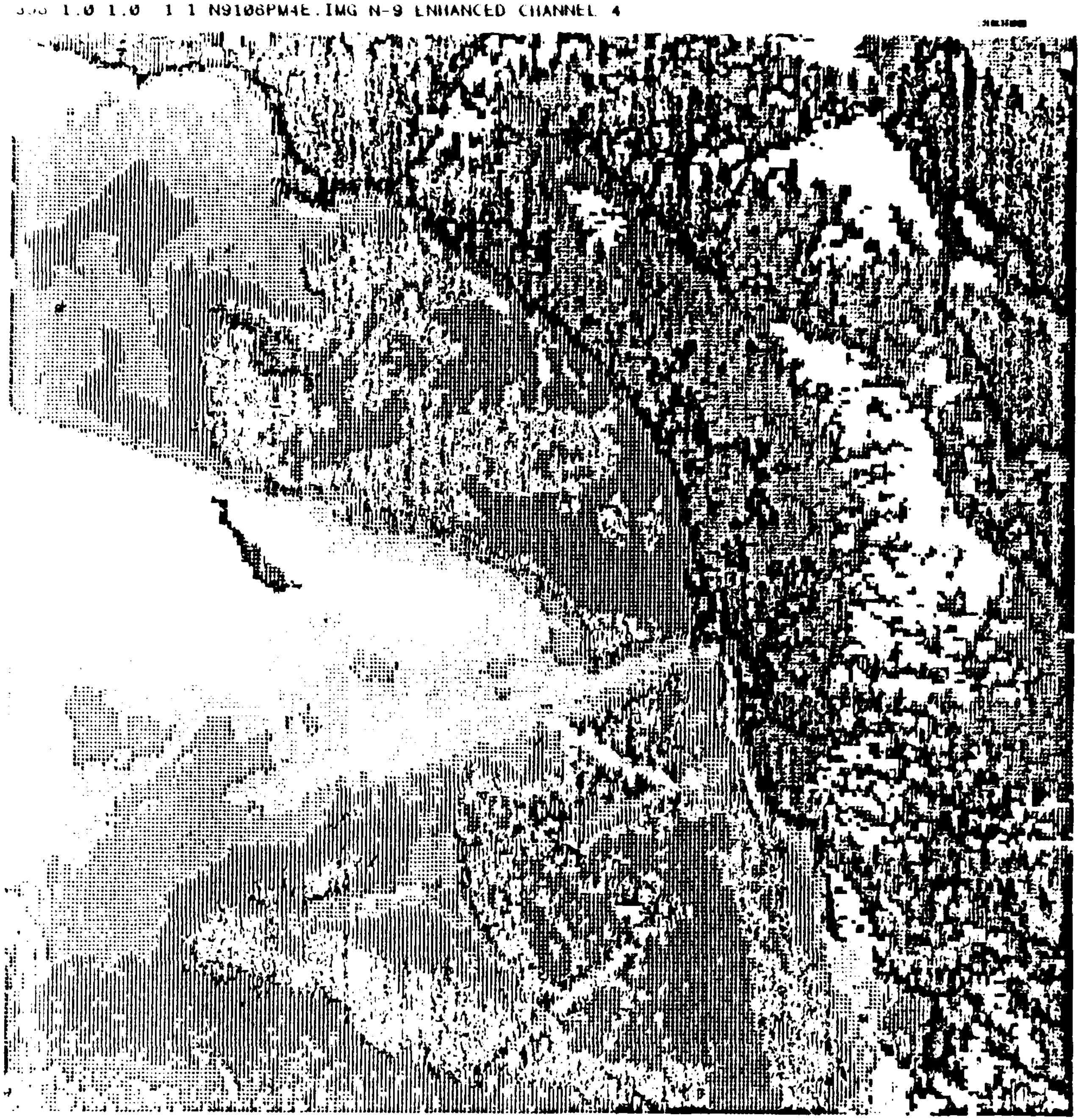

Fig. 4(d). Enhanced satellite image for data shown in Fig. 4(a)-4(c) and surrounding region.

Channel 5: Equivalent blackbody temperature (deg Celsius) = (pixel value * 0.339) - 48.27

Bandpass is 11.25 - 12.65 microns

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	290291292293294295296297298299300301302303304305306307308309310311312313314315316317318319320321322323324325326327328329
245	177178179179180179179180181181180180180181182182182182182182182183183182183182182183182182182182182182182182182182182182
246	176176179179179178179179180179179180179181182182182182182183182182183182182182182182182182182182182182182182182182182182
247	175175175176177178178178179179179179180182182182182182182182182182182182182182182182182182182182182182182182182182182182
248	172172174174175176176176178178178179180180181181182182182182182182182182182182181181182182182182182181181182182182182182
249	166168170172174170173175177178178179179180181181181182182182182182181181181181181180181181181181181181181181181182182182
250	161163163167167167169170176176177176178179180180177179180181181181178179179180181179179179180180180180180180181182182182
251	178173170163163167165167171171173171173175175175177175176177178178177178178178179179179178178179180180180181181182182182
252	180181184184163160160163165169170170170170173174174175176176176176175176177176177178178178177178179179180180180182182182
253	151155179178161159163164165166167168170171173172173172173173174174175175175175175175176178178178178180180181181181182182
254	150157170175164161162161162165167164165166170170169172172172172173176175175176176176177178179179180181181181181182181181
255	150162181184173163160162162165163164166166166167168170171171172173175175176177178178178179179179180181180180181180181181
256	157165182187174164158159159163163164165165166165167168168169171173174175176176177178177177178178178180180180180181181181
257	162165180186181170159159159161163164166155166166167165168167171174175173173175176176176177177177177179177178180180180179
258	165158160171183177172164162163163165165165164163163165165166168170172170172173173176176174176176176177177178178179179178
259	159158159162174182179158163164164165152162163164155165169167157168169168169170171174174168168172173175176177176178177178
260	160161159160170188186184172165163162169169167167167168168165164164164167168168168167167172172173173175176176176177177177
261	162163163163164172186190182174168168172172172171171170165165167157168172171170170170171173173174173175174174174175175176
262	162163165165164170190186183179179172170170170169169167171170172171171172171172171170172172173172172173174171170173174175
263	165163162162162163169191170184185181171167168170170172167168167167168170172171172173171170171172171172172173172173173173
264	163160157158157160165184190183184183170175169168168168168168171171171172172173172171171171169171171171170173173173173174
265	155155155154157160160177193190186187179175170168158158166165165167169171170171171172170170170170169170170168168169170172
266	158155160160160160160177181187184181179176172165167167166168168167166166163164167173173170168168168167168159162163165166
267	158159160160162162162167173185186185178182182180171168167167167157166165165165165169171158163167160159158161162163165166
268	159160162161159160159160162169188185185185188186182174169165164164165165162162162163163163158158159159160160160160160161
269	160162161161161160160161160167189189187190173194191185167163161162163162160160160162160159162161160159159158158158159160
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271	162161162164163160160158160160161174188191175175194191183188170164163152162160160161163162163162160157157158160161162161
272	163164164165162160158158162160158159172191197194196197197176188187166165164160162163162163163163163159158160161162162162
273	166165166165164162162162167161160160160163167185194185170166166169167165164163165166163162167163163162162162162162162162
274	167167166164163163163163163162162162161161165173170168168166167168168166164167167167168168167166164162162161162162163163
275	165165167163163163163163163163162163161158160162164165167157165157167170168169169170170168168165165165164162166165165164
276	164165164164165165164164163163164160159160160161163165167165167168169170170173172172171170168167165165165165167167165164
277	155153163167168167167155165166165163160160163155155157167165170170170172173175174173170168168170168168167157169158166166
278	167165166167169168169167166166165165159160163164166167168166170171172173175175176176173170171175173172170170169171170168
279	169168168168169169169167166168167164164155166157170170170159172173173175176176178178178176175177175174174173172173171169
280	167167169170169170171171167167165160166168166170173172170173174174175175176177178178178177177176175175174174174174173172
281	167165156170168171170168167157156168171172170172171170171172174175175175176177176177177176176176173175175175175173172171
282	167167167169169169169168165162164173171170172170170169170173174175174174175175176176175175174173174174174175174172172170
283	168168169168166170170165152158173172168173173170171170172172174175174175175175174174172172172173173173173173173173172172
284	170169167169168171168165163170172170171171173168169171172173175172173174173174172170169170172173173174173174174174173174
285	169157169164168170157157163171171170172173171168167172172173173171172170172173172170170171171172173174174174175174176175
286	167167170168168171167168170172171172171171168167170174174173171172171172174172172170171172172173176176176176176176177176
287	171166163163170168170173172171170171168169158168173174174172170170170171172172171173174174175174175177178178178178177177
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289	164157167169169169171172170167169164169171172173172172172171170172171172172170172172173174174174175177179179178178179179
290	169166169170169168170167166168165167168171173173169171173173173172173172170170171173174176176177176178179178179179179179
291	169170167168166168168168167167168170170173173170168169172174173172174173173173172174175176178178177179178176178179179179
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293	171177169158169169170168170170168165166168169166168172175175175175175174175175174174176177177178178178177178177178179178
294	174172169168168169168168169168163166165167167167170175175175175175176175176176175175176178178178178178178178178178178178
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296	175173173172172171171171171171171174175174174175175176176176176176176177177176176176178178177177177176176176177178178177
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298	175176176176175175176175174175175175176176175175175176176176176176176177177178178178176176176176176176176176176176176176
299	177175176176176176176175175176175175176175175175176175176175176176175178178178178177176176176176176176176177176176176175
300	177177176177177177176175176176175175176176176175175175175175176176177178178178177177176177176176176176177176176176175176
301	178177177178177177176176175177176176177176175175174175177175175178173178178178177177176176176177176176176175175175174176

Fig. 5(d). As in Fig. 1, for Channel 5 data.

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	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369
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268	163	162	162	163	164	167	165	166	166	166	168	169	166	171	171	170	170	171	170	170	171	172	173	175	174	175	175	176	176	178	179	181	182	182	181	181	182	182	182	182
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270	163	162	162	162	162	162	162	162	162	163	163	165	164	165	166	166	167	167	165	166	168	172	174	173	173	173	172	172	173	175	176	175	176	178	178	179	179	179	182	182
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276	165	164	165	166	167	166	167	168	168	165	165	164	164	165	165	165	166	166	165	165	166	166	167	168	167	168	167	169	171	171	172	170	170	173	175	173	172	173	175	178
277	166	167	167	167	167	167	168	168	167	165	165	165	165	165	166	166	167	166	164	166	166	165	166	166	167	167	168	170	170	171	171	171	170	173	173	171	172	174	176	178
278	168	167	166	167	167	168	168	168	167	167	164	164	165	165	166	167	166	165	164	167	168	167	168	168	168	170	171	171	171	171	170	170	169	170	170	172	172	173	174	178
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280	170	169	169	169	170	170	169	168	167	167	167	167	168	167	166	167	168	168	168	169	168	169	169	169	170	170	170	170	170	170	172	170	170	170	172	174	172	171	172	172
281	170	170	170	171	172	172	170	168	170	169	168	169	163	168	168	168	169	169	170	170	170	170	170	170	171	170	170	172	172	173	172	172	172	173	174	173	173	174	174	175
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283	171	171	171	172	172	172	171	172	172	170	171	171	170	170	170	170	170	170	170	170	170	170	171	171	171	173	174	174	175	175	175	176	175	175	175	175	174	175	173	175
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292	179	179	179	179	177	178	177	176	176	177	177	177	176	176	177	176	176	175	175	176	177	177	177	177	178	178	178	178	179	179	179	177	176	176	174	173	173	172	172	173
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Fig. 4(l). Channel 5, central panel

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Fig. 46. Channel 5 data, eastern panel.

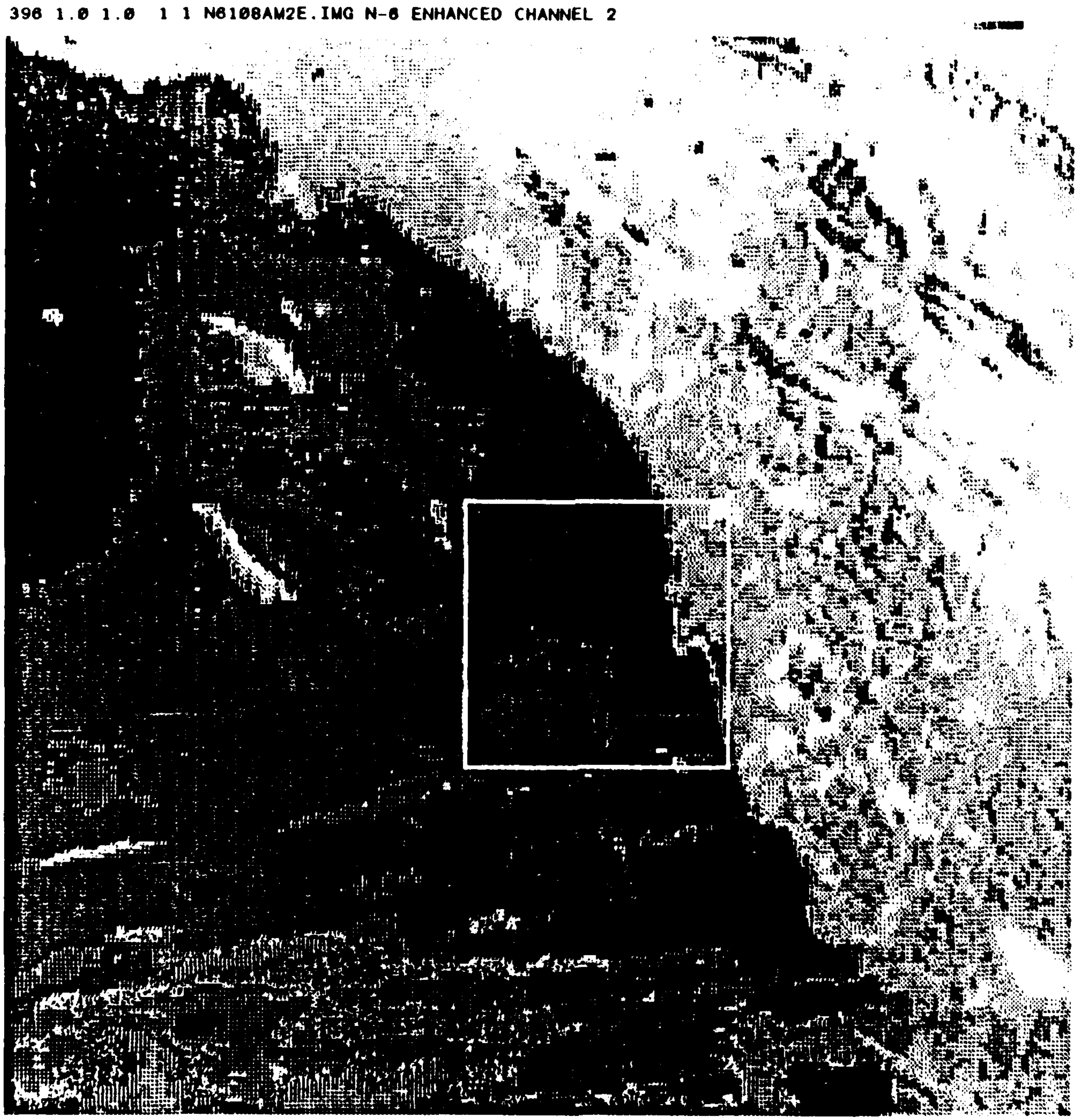

Fig. 6. Enhanced satellite image, showing immediate study area.

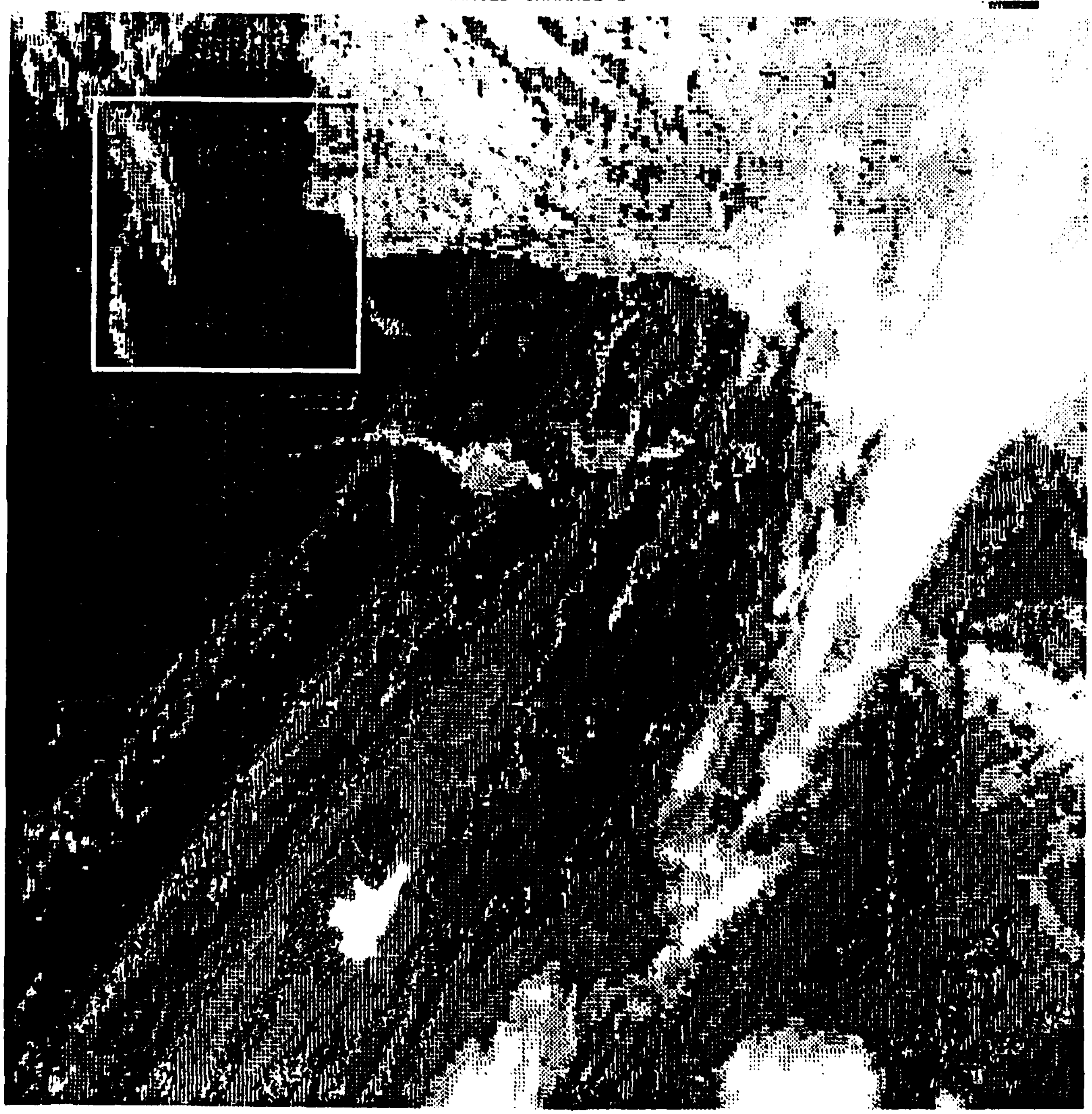

Fig. 7. Enhanced satellite image for 15 April NOAA-9 pass, showing area of pixel sampling within box.

Fig. 8. Enhanced satellite image for 17 April NOAA-9 pass.

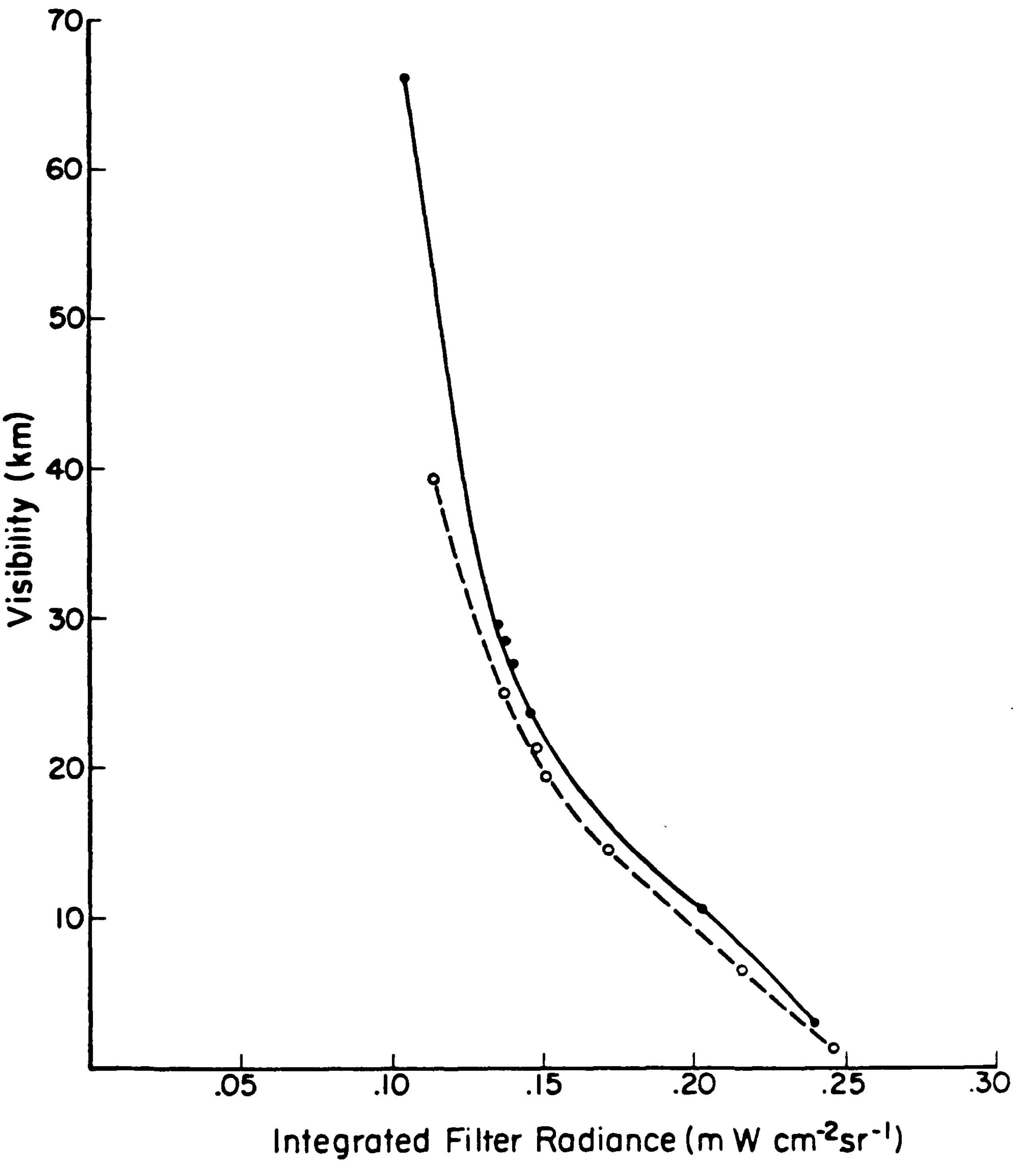

Fig. 9. Radiance calculated by LOWTRAN 6 for AVHRR Channel 2 [illegible] and resultant visibility for a range of surface meteorological [illegible]. Values of ICSTL parameter are 1 for solid circles, and 5 for [illegible]. Lines represent hand-drawn curves connecting the values.

241 496 141 396 1.0 1.0 1 1 N9107PM4E.IMG N-9 ENHANCED CHANNEL 4

Fig. 10. Enhanced satellite image for 17 April NOAA-9 pass (Channel 4).

Fig. 11. Enhanced satellite image for 18 April NOAA-9 pass (Channel 4).

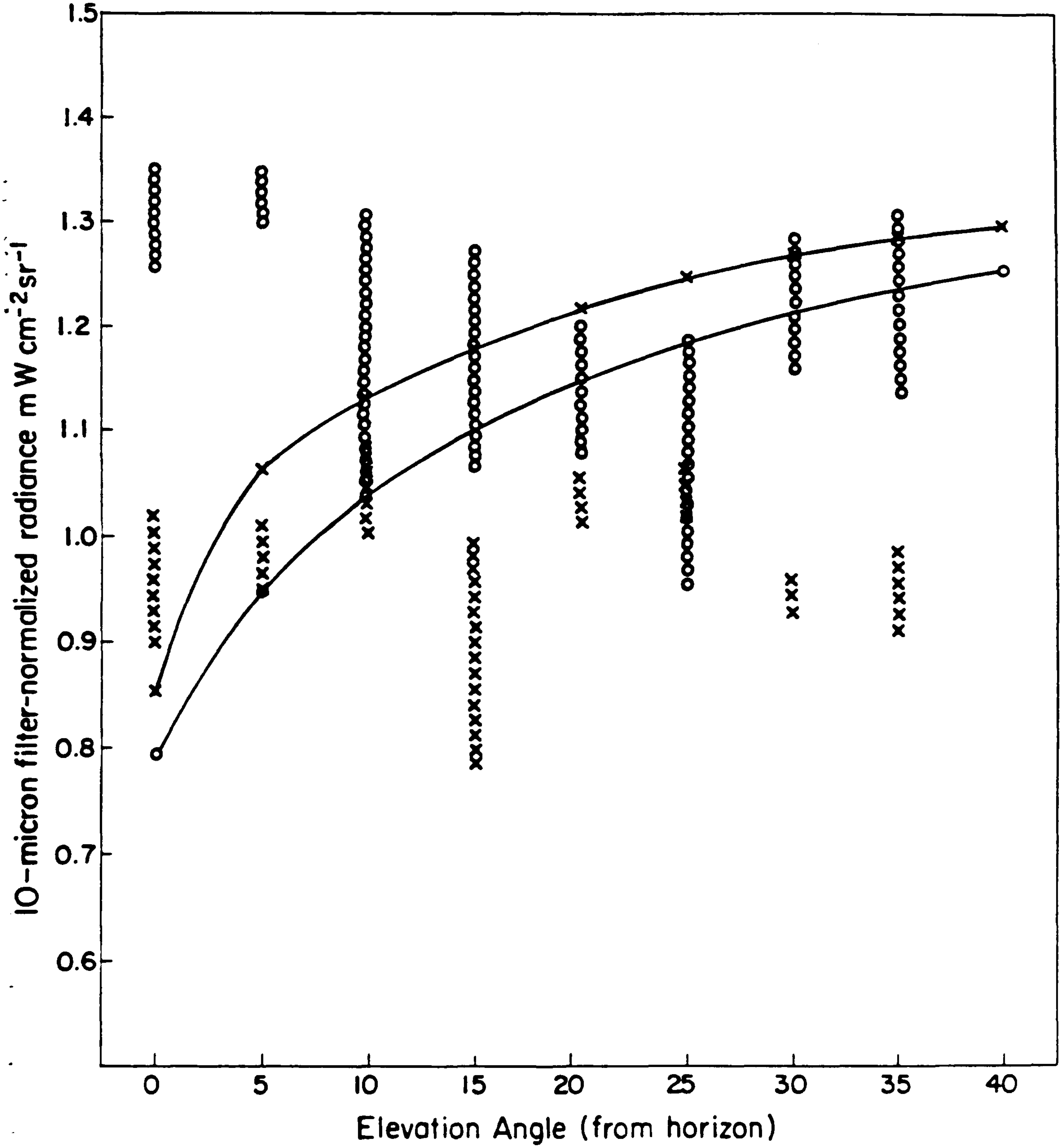

Fig. 12. LOWTRAN 6 radiance calculations for the 10-micron filter band (solid curves) used to obtain Spectral Radiometer clear air measurements (range of values shown in vertical bars of X and 0 symbols). X refers to data from 18 April; 0 for 16 April.

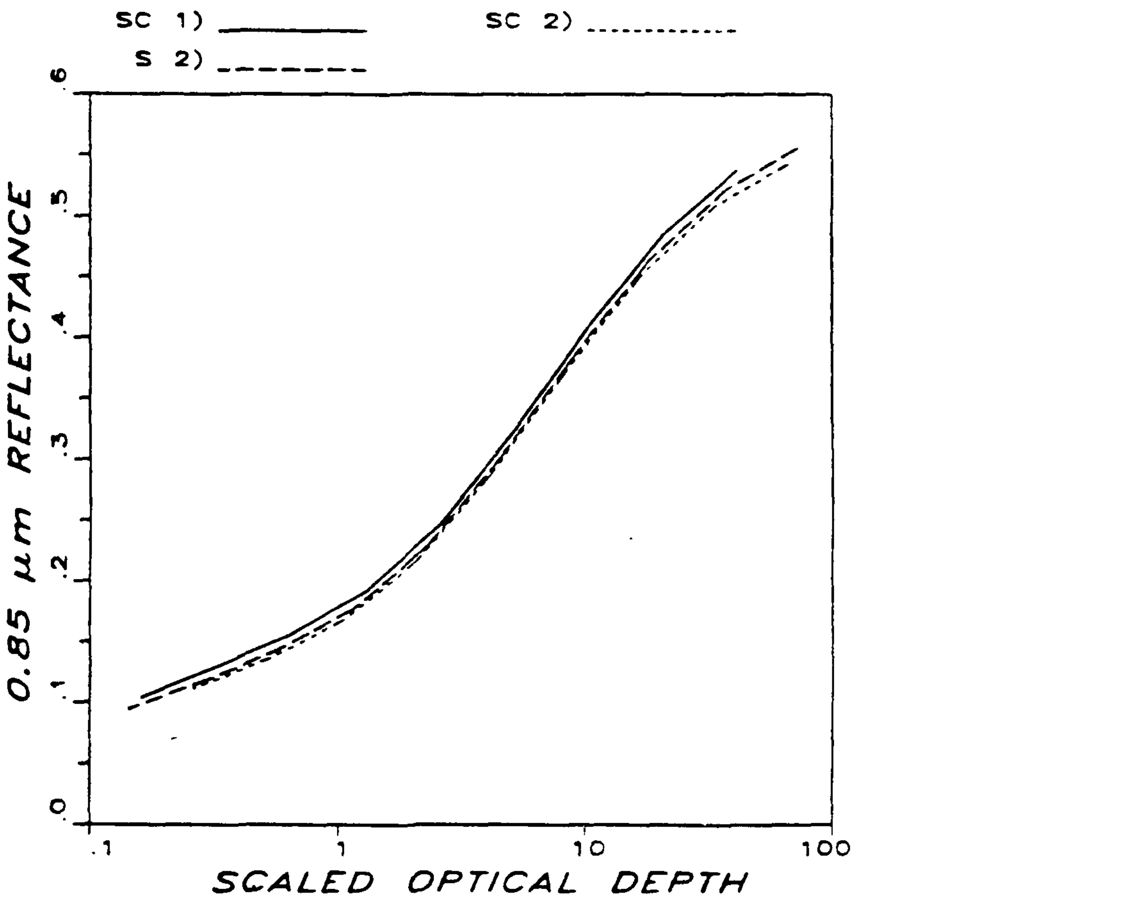

Fig. 13. Reflectance calculated for three different model cloud layers.

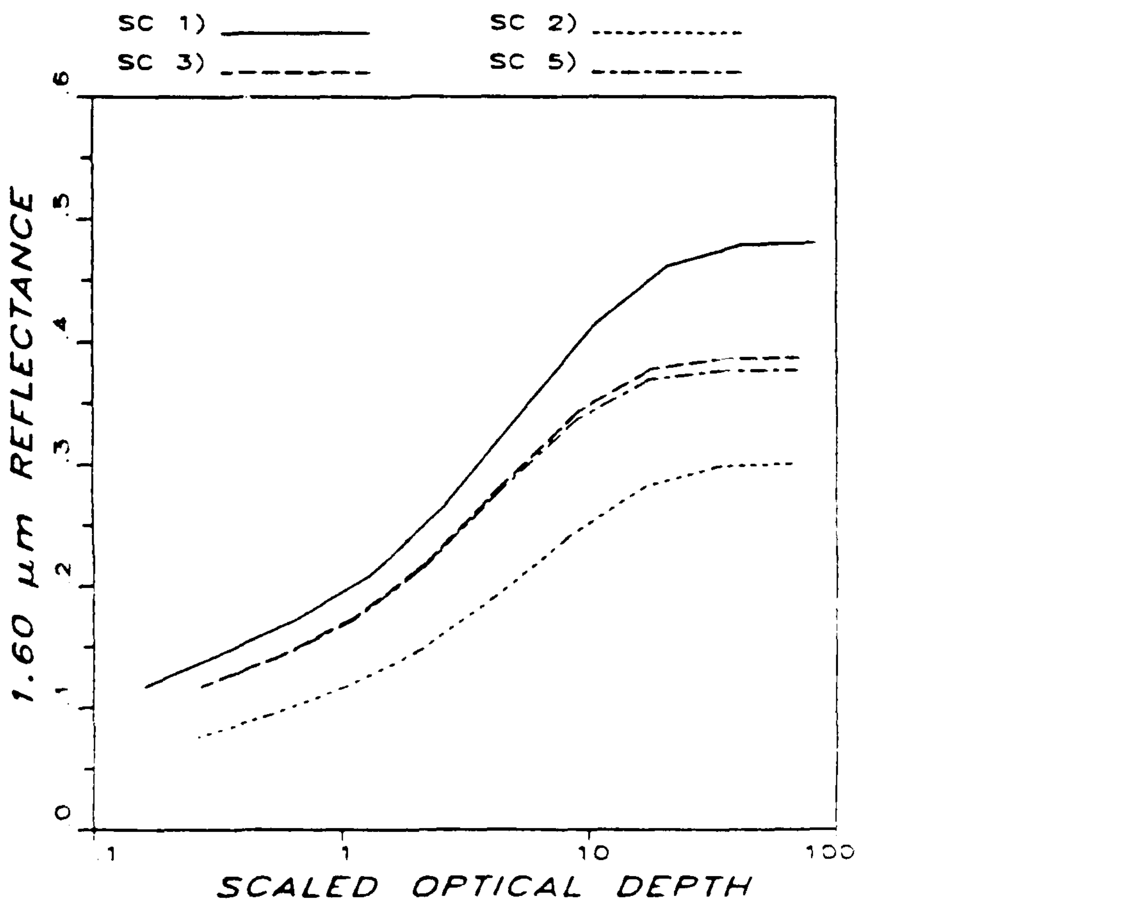

Fig. 14. 1.60-μm reflectance calculated for different model cloud layers.

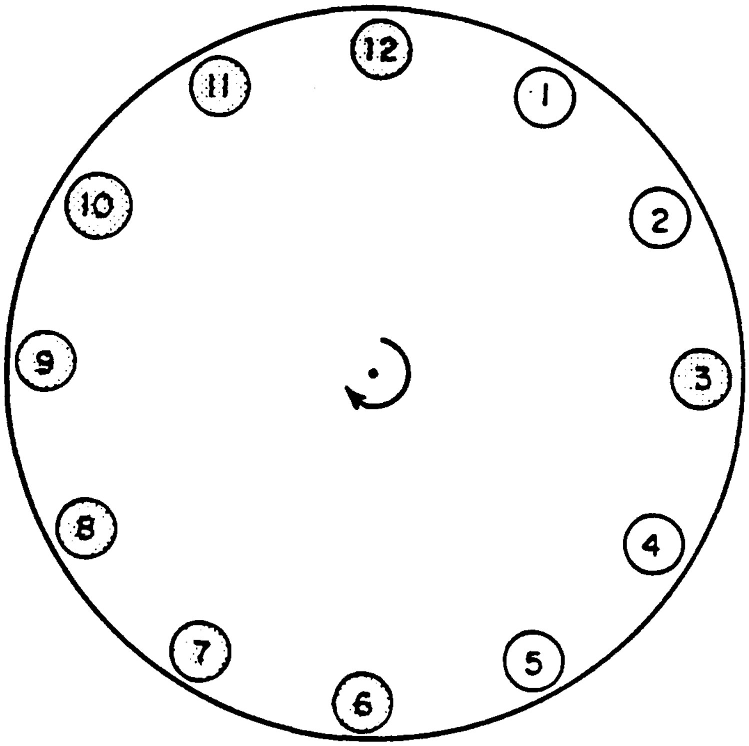

Fig. 15. Schematic diagram of Spectral Radiometer discrete filter wheel. The central wavelengths of each filter are listed below:

Filter #	Central Wavelength (μm)
3	3.7
6	2.2
7	0.85
8	0.65
9	0.85
10	1.6
11	1.6
12	10.5
(1,2,4,5)	(open)

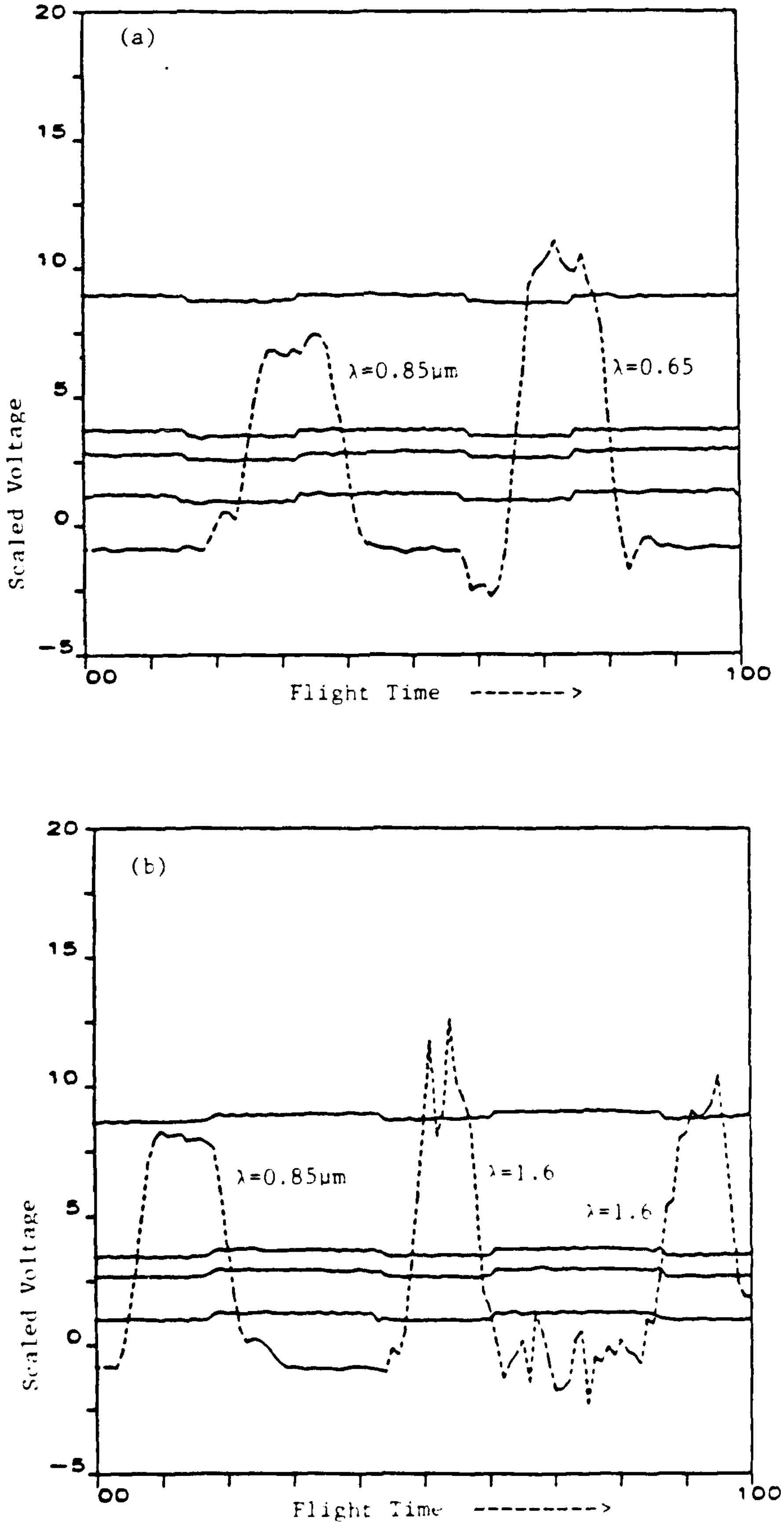

Fig. 16. Spectral radiometer (dotted) and shortwave flux (solid) data for stratus flight studies.

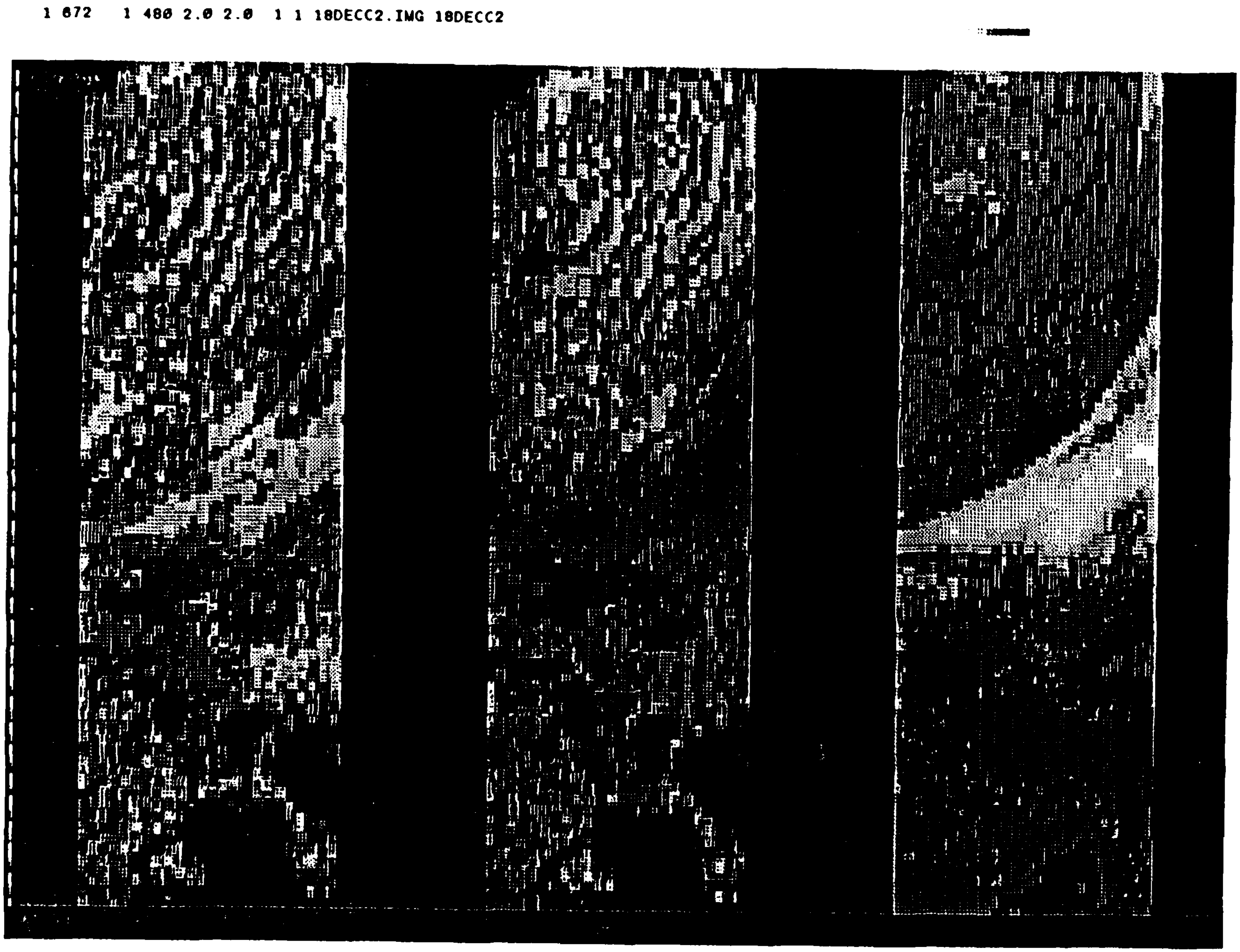

Figure 17. DMSP images in the visible (left), SSC (middle), and infrared (right) channels.

END
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E.A.